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Three factors which may impact upon carrel design are cloistering, social interaction, and territory-related behaviors. Level and manner of seclusion are discussed, and related literature findings are reviewed in this report. Social interaction, both student-to-student and instructor-to-student, are surveyed and the group size factor is carefully reviewed. Shared space adaptation can involve territorial and dominance behaviors. The potential impact of these factors is discussed. Conclusions suggested the need for a variety of customized learning spaces and a program to determine their impact upon learning. (Author)

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TERRITORIALITY IN CARREL DESIGN

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June 1977

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Carrel design is not yet based upon tested principles. Three factors which may impact upon carrel design are cloistering, social interaction, and territory-related behaviors. Level and manner of seclusion are discussed and related literature findings are reviewed in this report. Social interaction, both student-to-student and instructor-to-student are surveyed and the group size factor is carefully reviewed. Shared space adaptation can involve territorial and dominance behaviors. The potential impact of these factors is discussed. Conclusions suggested the need for a variety of customized learning spaces and a program to determine their impact upon learning.

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TERRITORIALITY IN CARREL DESIGN

I. INTRODUCTION

The systematic human engineering of customized learning spaces remains as a challenge to educators and vendors. Surveys of the state-of-the-art picturing study carrels have been presented by Benyon (1964), Ellsworth and Wagener (1963), Ellsworth (1973), and EPIE (1968). Human factors typically involved in designing several classes of carrels have been summarized in Spangenberg (1975). The state-of-the-art in learning environment or carrel design shows contrasting opinions on some very fundamental issues. Carrel design is not yet based on soundly derived empirical principles, but rather implements the untested notions of the persons planning or buying carrels. Performance, it is assumed, is influenced by the degree to which the physical facilities fit the needs of the learners. However, only minimal attention has been given some potentially critical factors in carrel design. Among the factors which may impact on the design of carrels, this paper will discuss cloistering, social interaction, and territory-related behaviors.

A carrel is defined as a specialized learning area that facilitates the activities necessary for individualized (or individual team) self-paced learning (Spangenberg, 1975). Carrels are found in various places such as libraries, instructional materials centers, instructional resource centers, and learning centers. The present paper emphasizes the carrel as found in the learning center—that is, the place of learning activity in an individual-oriented, preplanned environment which enables learners to interface with the body of knowledge and activities on which desired criterion performance are based.

Use of the carrel in the learning center as the focus of the instructional effort is based upon a family of philosophical assumptions, such as would be articulated in a systems approach applied to learning. These assumptions include the application of technology to learning for achieving instructional efficiency and effectiveness. A related philosophical commitment demands individualization of instruction since the locus of learning is in the individual. A learner-centered philosophy of instruction places the responsibility on the student for his own performance and usually permits some level of student self-pacing. Instructional activities designed to meet clearly stated and well-defined objectives are modularized and build upon previously achieved goals. Presentation of information in multiple sensory modalities is often included as is the requirement for student involvement in learning by doing. One popular account of some of the philosophical assumptions is contained in Yamasaki and Cox (1970). Another futuristic picture based on these assumptions is contained in Kong (1967).

II. CLOISTERING

The issue of cloistering is reflected in the level and manner of seclusion provided by a carrel. Visual and sound isolation range from virtually none (as when placing a bookrack on a table and calling it a carrel) to the mediated enclosed booth carrel giving 360° visual and sound isolation shown in Ellsworth and Wagener, (1963).

The effects of different levels of cloistering and size of the cloistered area may affect learning performance. Studies can be performed comparing performance in various tasks accomplished in various levels of cloistering and sizes of learning area. Then carrel design could be based upon sounder principles than the intuition of a learning center manager.

Canter (1968) tested the performance of English office workers in offices normally holding from seven to one hundred desks, using standardized personality and clerical aptitude tests. Based on his results, he suggested that performance decreases as room size increases and that this is not related to the level of distractions in various size offices. In a study using verbal operant conditioning in a counseling context, Haase and DiMattia (1972, 1974) reported room size as a significant factor. These three studies, however, appear to include undefined social interaction factors.

Moore (1967) compared the use of carrels and an open table type of accommodation in a language lab. He found that while most students expressed a preference for carrels, more actually used tables. Moore also noted that students at carrels were more easily disturbed. Other indicators are use patterns and user preferences in libraries that offer varying levels of cloistering. Students seem to select differing levels (high

seclusion carrel, medium seclusion carrel, group study room, library table, or lounge chair) of seclusion depending upon the particular task in which they are engaged and possibly some personality factors. Eastman and Harper (1971) tested the assumption that in selecting a library study space, carrels would be used. They found a small preference for *not* using them.

Sommer (1970) surveyed Introductory Psychology students regarding their preferred library location in studying for a midterm exam. He distinguished between low seclusion or public study areas (reference, periodical, and reserve room) and high seclusion (tables in the stacks and individual study carrels) study areas. Forty-nine of the 103 students surveyed expressed as their first preference a low seclusion area in which to study. Some reasons for selecting low seclusion areas indicated a need for presence of others (although away from them). Other reasons indicated by the 49 students were spaciousness, increased activity, and a general atmosphere conducive to study (that is, seeing others studying). However, those who preferred higher levels of seclusion indicated the quiet and fewer distractions (both visual and auditory) as reasons.

In a dormitory study environment, Van der Ryn and Silverstein (1972) report that when students share rooms, they usually rearranged their desks so that when at work, their angles of vision excludes the other from view. Results of a different survey reported in Sommer (1970) indicate that social stimuli are the major source of distraction for reading, and that unwanted eye contact should be avoided. Further, he reports that for many, noise stands out more and is more distracting against a background of silence than one of general ordered activity. An experimental study by Glass et al. (1969) showed that a series of unexpected noise distractions detrimentally affected task performance efficiency and decreased the tolerance for frustration. Unexpected noise distraction or unexpected variations in noise level (see Sanders, 1961, and more recently Theologus et al., 1974) appear to require some adaptation by the individual at some psychic cost. Dansereau et al. (1975) developed and assessed a learning strategy program that included practice in coping with distractions while applying techniques to help the learning of prose materials (three 1,000-word passages under different levels of audio distraction). During post-hoc analysis they found that the mean total performance of Rotter scale externals was significantly lower than internals when reading under conditions of audio distraction. The effects of distraction on learning would appear to require further careful study, noting that individual differences would also be involved.

Orr (1972) states that when constructing a study carrel, there is no need to make vertical dividers over 2 feet above the table, since the possibility of visual distraction is restricted while avoiding a claustrophobic situation. Brucker (1970) compared learning performance in a carrel to learning performance in a small seminar room. He found that high anxiety (Sixteen Personality Factor Questionnaire median split) subjects in an enclosed environment (carrels) performed significantly poorer than three other groups. Personality and environment interact, sometimes negatively. Another factor often associated with a high level of seclusion in a carrel is a homogeneous and unvarying learning environment. Noble (1963) claims that a homogeneous and unvarying environment produces boredom, restlessness, and lack of concentration. (See also Rapaport & Kantor, 1967). The question as to the validity of his statement can be answered by creative experimental designs in studies possibly analogous to the studies of esthetic surrounding by Maslow and Mintz (1972) and Mintz (1972).

Sommer (1969) concluded that only a diversity of spaces (providing different levels of seclusion) would meet the diversity of spatial needs of students. Privacy, he states, does not have a high absolute positive value in and of itself. However, when there is limited choice, properly designed study facilities to ensure individual seclusion would be extremely important for some students. High levels of seclusion reduce audio and visual distractions. Since certain kinds of tasks performed during learning would require disciplined individual concentration, seclusion can be of assistance.

III. SOCIAL INTERACTION

High levels of individualized seclusion inhibit social interaction. One potentially critical interaction is between the student and the teacher. When the carrel design does not permit student/teacher interaction, another location must be provided. It would seem that the necessary changing of the learning location would formalize the interaction, potentially reduce the number of interactions, and possibly provide queuing problems. It would also enhance the authoritative role of the instructor, provide the student

assurance of help when required; and provide variety in the learning locale. It should be noted that the use of a computer could permit some pre-programmed interaction.

Whether students learn best by themselves remains in doubt. Sullivan et al. (1974) report in their survey of learning centers that when the program of the learning center isolates students during instruction, those objectives in which personal interaction is an important element may be ignored. They note, however, that several of the learning center programs which they surveyed have integrated small group discussion sessions into the curriculum. Beggs and Olivero (1962) specifically make the recommendation that provisions for group work be made. Lee (1968) emphasizes the need for grouping in an individualized program as she suggests that groups are formed differently, for different purposes, and for different lengths of time. Payne (1968) observes that with programmed materials the most satisfactory social group contains between four and ten pupils.

Nevertheless, the structure and effects of small groups in education has received only minimal attention. Some evidence is provided by James (1951) for the size of natural informal groupings. He reported that 71 percent of informal and work groups (noneducational) were pairs. Three-member groups constituted 21 percent, 5 percent contained four members and only 2 percent contained five or more individuals.

It would appear that group size could depend upon the learning task and the manner in which it would accomplished, along with the social characteristics of its constitutents. Thelen (1949) suggests that the optimal group size is the smallest within which it is possible to have represented all the socialization and achievement levels required for the specific learning activity. These factors have not yet been adequately defined or researched.

Jelden (1971) suggested that individualized mediated instruction may best be accomplished in groups of two or three students rather than through a totally individualized situation. The performance of students working in pairs has been reported by some researcher (Amaria et al., 1968/9; Frandsen, 1969; Hurlock & Hurlock, 1972; Keesler Project Report, 73-116; Keesler Project Report, 73-120; Love, 1969) as equal or better than students learning individually from mediated instruction. Earlier studies of a similar nature are reviewed in Hartley (1966).

A study by Beamer and Lemke (1973) compared learning of pairs to individuals (fifth grade) in multiplying fractions using 1, 3, or 5 methods of presentation. They concluded that the performance of pairs presented material by a single presentation method appeared to be equivalent to individuals learning with multiple methods. Crist (1966) compared four students working individually and together in programmed instruction dealing with vocabulary. The same type materials that were rated "boring" under individual administration were received enthusiastically under the group condition. It appears that pairing or other small groups of students in carrel instruction certainly requires further research.

IV. TERRITORIAL AND DOMIANCE BEHAVIOR

Territorial and domiance behaviors are important concepts in adaptation to shared space. Sommer (1969) summarizes the state-of-the-art and concludes that withdrawal from social intercourse and slowing of movements result from overcrowding. Jussim (1974) suggests that indifference toward others and depersonalization increase with group density.

Often, it seems, carrels are intended to increase student density in learning facilities. (Incidentally trying to keep space requirements within 125 percent of traditional classroom usage). It is usually assumed that in a learning center, provisions will be made within the carrel environment to meet territorial needs and reduce dominance behavior of individuals.

Territorial behaviors are socially learned. Hall (1971), for example, reports that "the term trespass was virtually meaningless to our black subjects, whose territory is a group concern rather than a private or personal matter." The psychological meaning of space and use is also different in different cultures (Hall, 1966). However, recognition and use of these culturally conditioned student perceptions is important in the design of learning spaces. For example the emphasis on visual screening while audio distraction seems largely ignored in the design of current learning centers is probably a culture-bound phenomenon. (However, note that noise control is provided by using authoritative monitors.)

Among the design considerations in a carrel are such items as whether the learner will also use the

carrel as a "homebase." Will locker storage be made available as suggested in some of the carrels shown in Benyon (1964)? Should the learner sense that the carrel is his or her "home turf?" Alternatively, should the learning space emphasize the task performance? Should the learner use several specialized carrels during the course of a day? Orr (1972) suggests that the ideal study situation is the specially designed, individually assigned room with appropriate facilities, and personal control over light and temperature. The learner has freedom to study quietly or use such noisy devices as the typewriter or taperecorder. He may also smoke, eat, drink, or sleep as desired. A different social context is provided by the decision to assign or reserve carrels or to make them available on an as-needed basis.

Problems of disruptive behavior based on territorial and dominance behaviors will be reduced when adequate guidelines for student space requirements are developed. An overall plan must deal with many of the critical factors. For example, territorial needs may perhaps best be met in eating and sleeping areas rather than learning areas.

V. CONCLUSIONS

The suggested approach is to design carrels that optimize the learning environment for the specific selected learning activities. A variety of customized spaces would probably be required. Two or more carrels may be used by the student on a given day. Future flexibility permitting readjustment to new learning approaches also should be incorporated. (See also Vogel, 1968). Sommer (1969) points out that learning productivity in a laboratory environment tends to remain constant regardless of the variations. There may, however, be psychic costs (as suggested by the work of Glass et al., 1969).

In a study concerning student study behaviors, Gifford and Sommer (1968) visited dormitories on eight campuses to interview students about their study habits. They found that only a small amount of studying took place at the desk and that students working at their desks did not have a different grade point average than those working on their beds. Sommer (1969) concluded that there is no such thing as an optimal study environment for all students, but that most students' needs can be met by providing both flexibile facilities and a variety of facilities. DeBernardis (1967) made a similar suggestion. He further indicates that the learning environment should be an interesting, attractive, challenging, and dynamic place that is inviting and conducive to learning. Rapaport and Kantor (1967) suggest that people are persistent in choosing environments that provide change and interest.

When the learning facilities are inadequate for the student to use (as for example, the desk in his room) he will use things intended for other purposes (as for example, the bed). Not only must human factors be considered (see Spangenberg, 1975) but also those factors which influence human performance. Note, for example, that the dividers of most commercial carrels enclose more space than the minimum working area sizes indicated in VanCott and Kinkade (1972) or McCormick (1970). Further, as Propst (1968) clearly states, carrels are subarchitectural elements. They must be integrated into the overall learning center design and not treated as incidental pieces of furniture. Thus, simple experimental comparisons may be provide the best tool in establishing design criteria to be applied to issues such as cloistering, territorial, and dominance behaviors. The questions seem reasonably clearcut, their solution not nearly so clear or even straightforward.

Given the limited state of the art in learning environment design, an iterative process is recommended. By incorporating human factors and other factors that influence performance, alternative solutions to optimal learning activity environments could be provided. Principles could then be derived and systematic improvements made following careful analysis of how different students learn in these various environments.

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